



07-20-04

APT 2823
IFW

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Whitman et al.

Serial No.: 09/542,783

Filed: April 4, 2000

For: SPIN COATING FOR MAXIMUM
FILL CHARACTERISTIC YIELDING A
PLANARIZED THIN FILM SURFACE

Confirmation No.: 6870

Examiner: B. Kebede

Group Art Unit: 2823

Attorney Docket No.: 2269-4294US

NOTICE OF EXPRESS MAILING

Express Mail Mailing Label Number: EV325781385US

Date of Deposit with USPS: July 19, 2004

Person making Deposit: Christopher Haughton

REPLY BRIEF

Mail Stop Appeal Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attn: Board of Patent Appeals and Interferences

Sir:

This Reply Brief is being submitted in response to the Examiner's Answer dated May 19, 2004, within two months of the mailing date of the Examiner's Answer, and in TRIPLICATE, as required by 37 C.F.R. 1.192(a).

(7) GROUPING OF CLAIMS

The Examiner has objected to the grouping of the claims, as set forth in the Appeal Brief. To reiterate, claims 1-17 should be grouped together. Claim 1 is the most generic claim of this group. Claims 2-17 stand with claim 1. As previously indicated, claim 2 does not fall with claim 1 for the reasons that are set forth the in the ARGUMENT section of the Appeal Brief. Additionally, none of claims 3-7 falls with claim 1 for separate reasons that have been explained in the ARGUMENT section of the Appeal Brief.

(8) ARGUMENT

(A) Rejections Under 35 U.S.C. § 102(e)

It has been asserted, at page 11 of the Examiner's Answer, that the disclosure of U.S. Patent 6,278,153 to Kikuchi et al. (hereinafter "Kikuchi") has been mischaracterized in Appellants' explanations as to why independent claim 1 recites subject matter which, under 35 U.S.C. § 102(e), is allowable over the subject matter described in Kikuchi.

It is respectfully submitted that the disclosure of Kikuchi has not been mischaracterized.

In this regard, with respect to the requirements of independent claim 1 that material be disposed on a surface of a semiconductor device structure "so as to substantially fill . . . at least one recess, . . . material covering [the] surface having a thickness less than a depth of [the] at least one recess . . . , [and] an upper surface of at least a portion of [the] material over or within [the] at least one recess being substantially planar," Kikuchi includes no express or inherent written description that any portion of the spin-coated resist described therein is substantially

planar or that the thickness of portions of the resist that cover the surface of the illustrated semiconductor device structure are less than a depth of at least one resist-filled recess therein.

The lack of express written description is readily apparent from a reading of Kikuchi. The statements that have been made in the Appeal Brief to establish that Kikuchi does not expressly or inherently describe a spin-coated resist with a substantially planar surface, and that the spin-coated resist described in Kikuchi would, in fact, have a rather non-planar surface, have not been made to misrepresent the description provided by Kikuchi. Rather, each of these statements is based upon the fact that liquids, such as resist, are known to have some surface tension. Moreover, resists are typically viscous liquids and, thus, the surface of a resist layer may not planarize on its own. These properties of resists are evident from the facts that resists must be spin-onto semiconductor wafers and they do not flow off semiconductor wafers when placed thereon.

Additionally, the drawings of Kikuchi are merely simplified representations that cannot be relied upon to establish the Examiner's assertion Kikuchi discloses a spin-coated resist with a substantially planar surface or the thickness of resist over a semiconductor device structure relative to the depth of a recess in the semiconductor device structure. This reasoning is well-founded in the patent laws, as set forth in the Appeal Brief.

Further, nothing more than the language that appears in independent claim 1 has been argued by Appellants.

With respect to the 35 U.S.C. § 102(e) rejection of claim 2, the Examiner has asserted that Figs. 2 and 3, as well as the accompanying text, of the above-referenced application are the sole sources of support in the above-referenced application for the recitation "substantially

fill[ing] . . . at least one recess without substantially covering [a] surface” of a semiconductor device structure. Figs. 2 and 3 show a process in which material is introduced into the recesses of a semiconductor device structure and applied to the surface thereof, then removed.

Examiner’s Answer, pages 12-13. The Examiner then reproduces FIGs. 6E, 6F, and 16D-16F of Kikuchi to illustrate similar subject matter. Notably, each of these figures shows material that remains within recesses following processing that has removed the material from the surface of a semiconductor device structure. Col. 18, lines 3-5; col. 40, line 66, to col. 41, line 1.

The Examiner’s assertions are incorrect. To provide a nonlimiting example, the as-filed specification of the above-referenced application, at page 6, lines 18-30 (*see, especially*, lines 26-27), quite clearly explains that “the surface of [a] semiconductor substrate [may] remain[] substantially uncovered by . . . mask material” when material is introduced into recesses that have been formed in the semiconductor substrate.

Kikuchi, therefore, lacks any express or inherent description of the subject matter recited in claim 2.

(B) Rejections Under 35 U.S.C. § 103(a)

It has been asserted that one of ordinary skill in the art would have been motivated to combine the teachings of Kikuchi with those of U.S. Patent 6,117,486 to Yoshihara (hereinafter “Yoshihara”) to render unpatentable the subject matter recited in claims 3-7. Examiner’s Answer, pages 15-16.

While the broad teachings of Kikuchi and Yoshihara are similar—they both relate to spin-on processes for applying resist to semiconductor device structures, neither of these

references teaches or suggests that at least a portion of a surface of material that has been introduced into at least one recess of a semiconductor device structure may be substantially planar, as required by independent claim 1. *See Appeal Brief, pages 13-15.*

Further, Kikuchi and Yoshihara both lack any teaching or suggestion of the specific spinning rate recited in claim 5.

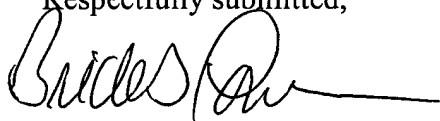
Therefore, one of ordinary skill in the art would not have been motivated to combine the teachings of Kikuchi and Yoshihara in the manner that has been asserted; *i.e.*, in such a way as to render the subject matter recited in claims 3-7 obvious or otherwise unpatentable.

(11) CONCLUSION

- (A) Claims 1, 2, 8, 9, 11, 16, and 17 are allowable under 35 U.S.C. § 102(e) for reciting subject matter which is not anticipated by that the subject matter taught in Kikuchi;
- (B) Claims 3-7 are nonobvious under 35 U.S.C. § 103(a) and, thus, allowable over the asserted combination of teachings from Kikuchi and Yoshihara;
- (C) Claim 10 is allowable under 35 U.S.C. § 103(a) for reciting subject matter which is patentable over that taught in Kikuchi, in view of teachings from Lin; and
- (D) Each of claims 12-15 is allowable under 35 U.S.C. § 103(a) for reciting subject matter which is allowable over that taught in Kikuchi, in view of the teachings of Park.

Reversal of the 35 U.S.C. § 102(e) rejections of claims 1, 2, 8, 9, 11, 16, and 17 and of the 35 U.S.C. § 103(a) rejections of claims 3-7, 10, and 12-15 is respectfully requested. It is also respectfully requested that withdrawn claims 18-87 be returned to consideration, and that claims 1-87 be allowed.

Respectfully submitted,



Brick G. Power
Registration No. 38,581
Attorney for Applicants
TRASKBRITT, PC
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

Date: July 19, 2004

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